

G-Plates

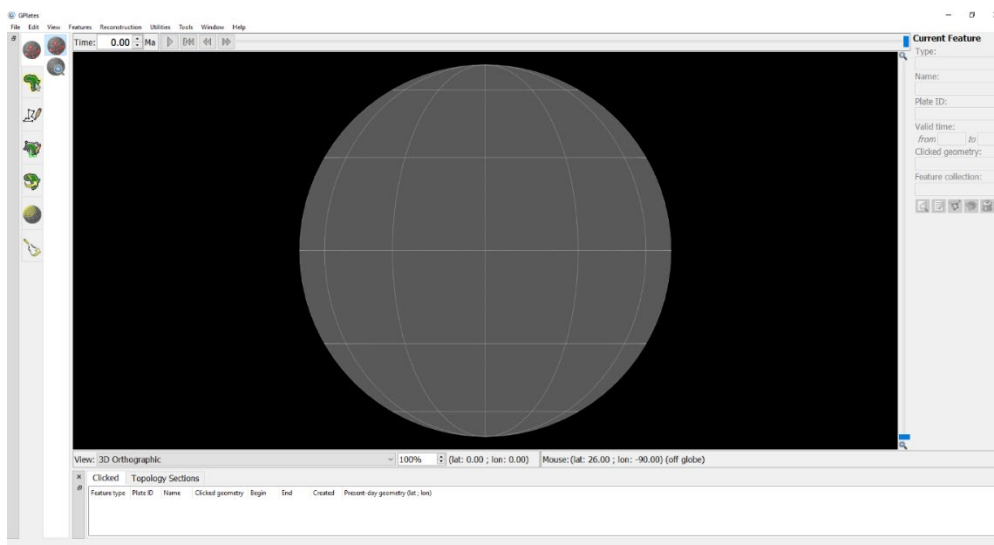
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Note that this is actually a research tool where things can be actively changed but it is also able to be used to look at observations of an existing plate tectonic reconstruction.

Getting Started:

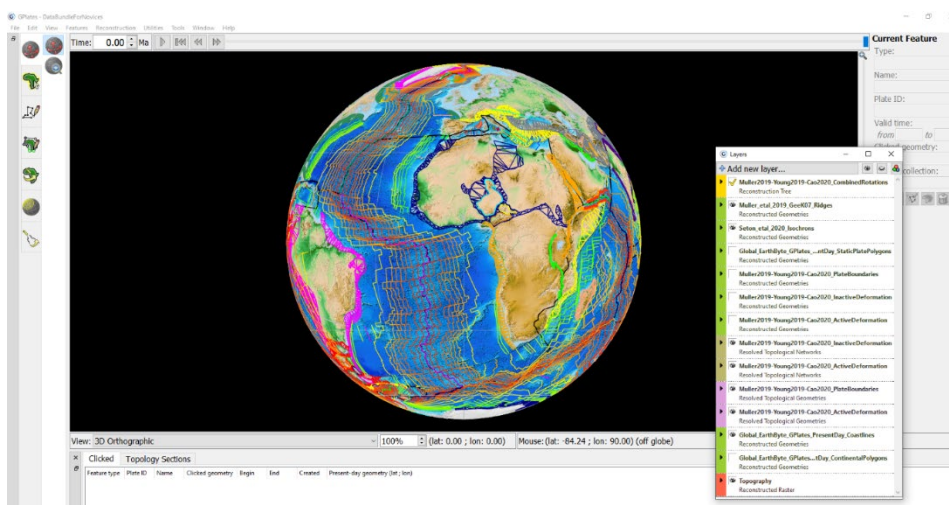
You can open source GPlates version 2.3 from <https://www.gplates.org/> (see <https://www.earthbyte.org/download-gplates-2-3/> and there are versions for windows, mac and linux). Note you may need to repath for the location of the source files if the layers come up with broken links. The following instructions are for windows.

From the start menu search for gplates and launch the gplates-2.3.0

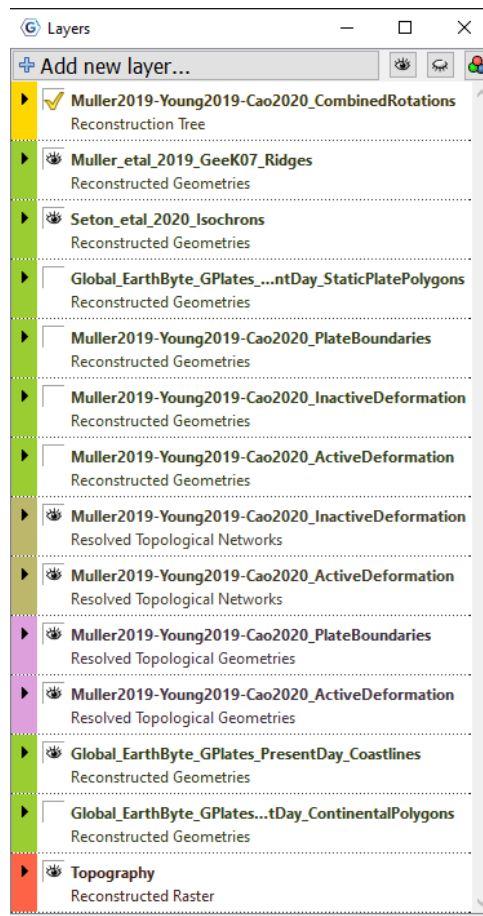


File – Open Project and navigate to

C:\Program Files\GPlates\GPlates 2.3.0\GeoData\DataBundleForNovices\
DataBundleForNovices.gproj and open



Tab on and off the different layers by clicking on the eye in the floating layer menu until you understand what each layer is and chose a selection you find useful. If this floating menu is hiding you can reshew it under “Window – Show Layers”



You have (from bottom):

1. **Topography – coloured raster file of present day topography and bathymetry. Note this is bound to bits of crust so while at different times it may move it will not change and may not be correct in terms of the paleo-topography/bathymetry present at those times. Think of this more as a geographic marker to help you track areas.**
2. **Present day continental polygons – this is a constructional layer and may not be that useful to have turned on – parts of the topography raster are tied to these blocks.**
3. **Present Day Coastlines as a geographical marker (note geology doesn't stop at the coast and the location of the coastline today is just a product of the current sea level)**
4. **Active deformation of continental crust at different times as described through time in the papers by indicated. This allows for the fact the (continental) crust could be stretched or compressed so this reconstruction has more than just moving around undeforming rigid blocks through time (note there is a pink, brown and green tabbed layer associated with this)**

5. Plate boundaries as described through time in the papers indicated (note there is a pink and green tabbed layer associated with this).
6. Inactive deformation of continental crust – don't worry too much about this. After active deformation has ceased it gets transferred to this category so that the past activity/deformation is still appropriately carried through time in the reconstruction (note this is a brown and green tabbed layer associated with this)
7. Present Day static Plate Polygons. The Earth's crust today is broken into different chunks that have different trajectories through time. Note these maintain their current shape and hence can overlay each other in the past implying deformation of the crust (thinning or compression) has occurred.
8. Isochrons – seafloor ages derived from paleomagnetic data on the seafloor and available radiometric or paleontological dates. The oceanic crust carries magnetic stripes of remanent magnetisation that corresponds to the direction of the earth's magnetic field (which reverses periodically through geological time) at the time the crust cooled through ~650 degrees C.
9. Mid Ocean Ridges (where the generation of new oceanic crust occurs)
10. The reconstruction information about plate motions to make all of the attached pieces move in space and time.

Note the different tab colours indicate different classes of information in the reconstruction.

These datasets come from a variety of recent publications. The most recent functionality of G-Plates is documented in:

Müller, R. D., Cannon, J., Qin, X., Watson, R. J., Gurnis, M., Williams, S., et al. 2018. [GPlates: Building a virtual Earth through deep time](#). *Geochemistry, Geophysics, Geosystems*, 19. doi:10.1029/2018GC007584.

Manipulation and analysis

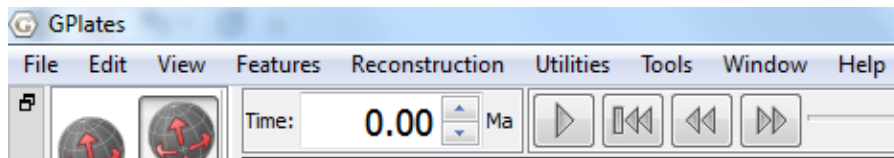
Use the “Drag Globe” icon to rotate the view to different parts of the earth.



Use the “Choose Feature” Icon to identify items – this is particularly useful to identify isochron age as they aren't labelled. The information will appear in the “Clicked” panel at the bottom of the GPlates window. You can also use this tool to get a Plate ID

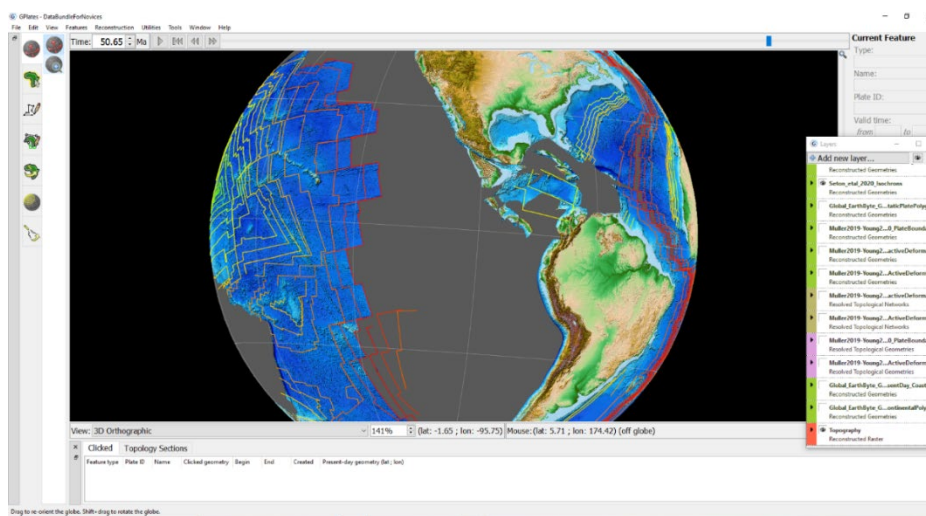


Run the reconstruction by hitting the play button in the top panel:

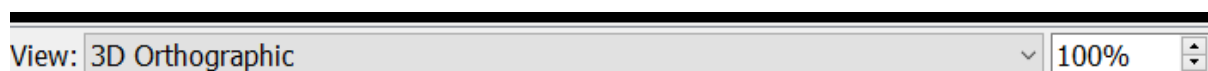


This will run a plate reconstruction through time from the Devonian to today. You can pause the reconstruction or use the “Drag Globe” Icon on look at different parts of the planet. You can also still toggle layers on and off.

Note when you go back in time (with topography turned on) you will notice grey gaps where there isn't any topography. This is due to the fact that the crust that was in these locations at these times no longer exists at the surface of planet earth and has been subducted. You will also see grey gaps at the mid ocean ridge itself as it is known the crust that was formed at that ridge in the past will look nothing like a 'ridge' today.



You can change the view from the default 3D orthographic using the pull down menu so you can see the whole earth at once in 2D.



In addition to the desktop active research tool different components have been captured with optimised graphics for different components at play in web viewers:

- Isochrons have been determined from the character of magnetic anomalies on the seafloor. Global magnetic anomalies EMAG2 (Maus et al., 2009) can be seen at https://portal.gplates.org/cesium/?view=EMAG2_V2
- Linked to isochrons in the main tool a coloured map of seafloor age overlain on bathymetric morphology can be accessed through the GPLates webportal at <http://portal.gplates.org/cesium/?view=AgeGridP>
- Highlighting how geological matches played into early development of ideas of continental drift a coloured map of geology overlain on the plate reconstruction through time can be accessed through the GPLates webportal at <https://portal.gplates.org/cesium/?view=GeologyR> With the legend available <https://portal.gplates.org/portal/geology/>